

ASSOCIATION OF MATERNAL SOCIO-BIOLOGICAL FACTORS WITH BIRTH-WEIGHT OF NEWBORN BABY

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Abstract

Birth weight is an indicator of future health and survival of child. Prevalence of low-birth weight (LBW) infant in our community is high. Many socio-biological factors influence birth weight. A study is conducted in Dhaka city during a period of 18 months in 2001-2002 to examine associations of some socio-biological factors with birth weight. Five hundred and sixty newborn babies along with their mothers constituted study population. The study shows the average birth weight of newborn baby is 2507 ± 580 gm and the prevalence of low birth weight baby is 46.6%. Maternal parity, birth spacing, duration of pregnancy, residence, family income, maternal literacy and occupation all are significant influencing factors of birth weight. Gestational age of baby shows highest degree ($P < 0.001$) of association with birth weight. Though maternal age is positively associated with birth weight, is statistically insignificant.

Key words: socio-biological factors; parity; pregnancy duration; spacing; association; birth weight.

Introduction

Bangladesh is a developing country. Majority (>80%) of the population¹ live in the rural areas where illiteracy, poverty and malnutrition are widely prevalent. Health service facilities even for the neonate, the most vulnerable group is not satisfactory till date in rural community.

Prevalence of low-birth weight (LBW) baby in our community is not less, rather high accounting 32%² or even 46.6%³. Birth weight is an indicator of future health and survival of the child. It is known to be an important factor which determines the rediness with which the newborn baby adjusts to its surroundings. Low birth weight is associated with a very high neonatal mortality, proneness to infections and difficulties in maintaining adequate nutrition⁴.

The adverse effects of low birthweight is also studied by other researchers^{5,6}.

Birth weight has been influenced by many socio-biological factors. It has been seen that mother who enter pregnancy in good health and have not suffered from nutritional deprivation, will have larger and healthier infants than mothers who do not have such advantages. Larger women will most likely have a larger baby and her weight increase will be greater than that of a small woman. In fact, at birth the baby of a woman weighing 75 kg and measuring 170 cm can be as much as 750gm heavier than the baby of one measuring 150 cm and weighing 40kg⁷.

A significant difference of birth weight is observed between babies born in affluent societies and those born in the developing countries. Weight at birth is also influenced by factors operating during pregnancy, serious illness, complications of pregnancy, nutritional deprivation, emotional and physiological stress can all influence the growth of fetus through their adverse effect on the mother⁸.

Birth weight of newborn baby is correlated with maternal age^{3,8,9,10}, weight of mother^{2,3,8} height of mother^{2,3,8} mid-am-circumference of mother^{2,3,8} parity^{3,8,10} gestational age of baby^{3,8} birth spacing^{3,8}, economical conditions³ educational status³ occupation³ and antenatal visit of mother³.

There is paucity of data on many socio-biological determinants of birth weight in this country. However, such information is of interest from the point of public health view. In this paper, some parameters are considered and an attempt has been made to examine associations of such socio-biological factors with birth weight.

Material and methods

Five hundred and sixty live born babies with their mothers from two different hospitals of Dhaka city from 1st July 2000 to 25th December 2001, constituted study population. Seriously handicapped, babies with major congenital malformation, caput succedaneum or gross cephal hematomas, seriously ill, twins and babies weighing <1000 grams are excluded. Babies of mothers having serious obstetrical or medical problem or diabetes are also

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excluded. Maternal age, parity, birth spacing, duration of pregnancy, maternal residence, family income, maternal literacy and occupation is studied. A simple proforma is designed to record data. A high sensitive slightly modified weighing scale is used as research equipment. Birth weight of baby is recorded up to a minimum value of 20gm. Data is collected by face-to-face interview of mothers, from case sheets and by measuring newborn babies. Standard statistical methods are used for processing data.

Results

The work shows the mean birth weight of newborn baby is 2507 ± 580 gm and that of only term baby is 2770.4 ± 402.5 gm. The mean age of mother is 26.11 ± 5.55 years and mean gestational age of baby is 37.9 ± 3.1 weeks

increase is insignificant from the age group of 20 years and above. The proportion of LBW babies is lower in the higher maternal age group.

(ii) Parity and birth weight:

The mean parity in this study is 1.89 with standard deviation of ± 1.22 . Maximum mothers (about 78%) have parity of one or two. Birth weight is found to be lower in the first and second born, rising considerably in succeeding pregnancies. Most of the first and second born (about 50%) are LBW babies. The positive relation of parity with birth weight is found to be highly significant ($p < 0.01$) (Table -II).

iii) Birth spacing and birth weight:

The mean birth spacing in this work is found to be 33.8 ± 24 months. Percentage of LBW is more ($\geq 50\%$) among those who have birth spacing less

Table 1 : Birth Weight of 560 newborns by the age of mother.

Age group of mothers (in yrs)		Birth weight (in gm)				Total n=560 (%)
		<1500 n=28 (%)	1500-1999 n=76 (%)	2000-2499 n=157 (%)	≥ 2500 n=299 (%)	
<20	n=43	0.4	1.4	2.5	3.4	7.7
20-24	n=183	1.6	3.8	10.4	17.4	32.7
25-29	n=179	2.1	3.8	8.9	17.1	32.0
30-34	n=96	0.5	3.6	2.7	10.4	17.1
≥ 35	n=59	0.4	1.1	3.6	5.5	10.5
Total	n=560	5.0	13.6	28.0	53.4	100.0

$P > 0.05$

Table II : Birth weight of newborns by parity of mothers.

Parity of mother		Birth weight of newborn babies (in gm)				Total n=317 (%)
		<1500 n=16 (%)	1500-200 n=51 (%)	2000-2499 n=80 (%)	≥ 2500 n=170 (%)	
1	n=282	3.2	5.2	16.6	25.4	50.4
2	n=157	1.1	6.6	6.3	14.1	28.0
3	n=58	0.4	0.4	2.0	7.7	10.4
≥ 4	n=63	0.4	1.4	3.2	6.3	11.3
Total	n=560	5.0	13.6	28.0	53.4	100.0

$P < 0.01$

i) Maternal age and birth weight: In this work, birth weight is found to be lowest in the babies of mothers in the age group of <20 years (Table -I). It is observed that with higher maternal age, the mean birth weight of newborn is also higher, but this

than 2 years. More than 36% mothers showed birth spacing less than 2 years. However, the positive relation of birth weight with spacing is found to be significant ($p < 0.01$). (Table-III).

iv) Duration of Pregnancy and birth weight:

In this work, about 29% babies are preterm with average birth weight of 1863±408 gm. The percentage of term babies are about 67% with average birth weight of 2770±403 gm and only 3.5% babies are post-term with birth weight of 2896 gm (SD±372 gm). The study also reveals that out of 165 preterm babies all are LBW except one, who has normal weight. The proportion of LBW babies are least in post-term babies followed by term babies. Association of birth weight and gestational age is found to be highly significant ($p<0.001$) (Table-IV)

income group up to Tk. 4,000 per month, but the weight increases steadily from income group of Tk. 4,001 monthly to onwards. Prevalence of LBW baby is about 70% in families having monthly income up to Tk. 2,000 in comparison to only 19% LBW baby in families with monthly income of Tk.>8,001. This positive correlation of birth weight with family income is statistically highly significant ($p<0.01$) (Table -VI)

Vii) Educational status of mother and birth weight:

Table III : Birth weight of new born babies by birth interval

Birth interval (in month)		Birth weight of newborn babies(gm)				Total n=317 (%)
		<1500 n=16 (%)	1500-2000 n=51 (%)	2000-2499 n=80 (%)	≥2500 n=170 (%)	
<20	n=28	0.9	-	3.5	4.4	8.8
12-24	n=88	2.8	7.3	6.0	11.7	27.8
25-36	n=69	0.9	4.1	14.4	12.3	21.8
37-48	n=43	-	1.6	4.1	7.9	13.6
≥48	n=89	0.3	3.2	7.3	17.4	18.1
Total	n=317	5.0	16.1	25.2	53.6	100.0

P>0.01

Table IV : Distribution of newborns by birth weight and gestational age

Gestational age of babies (in week)		Birth weight of babies (gm)				Total n=560 (%)
		<1500 n=28 (%)	1500-2000 n=76 (%)	2000-2499 n=157 (%)	≥2500 n=299 (%)	
Preterm<37wk	n=165	5.0	12.1	12.1	0.2	29.5
Term37-42wk	n=376	-	1.4	15.4	50.4	67.1
Post term>42wk	n=19	-	-	0.5	2.9	3.4
Total	n=560	5.0	13.6	28.0	53.4	100.0

P<0.01

v) Maternal residence and birth weight:

In this study, half of the mothers come from rural areas. The least average birth weight (1998±445 gm) is found among the slum group and is the highest (2604±618 gm) among urban babies. About 91% babies from slum areas, 50% babies from rural areas and 36% from urban areas shows LBW. The proportion of very low birth weight babies is highest among slum babies. The mean difference of birth weight is significantly associated with residence of mother (Table -V).

vi) Family income and birth weight:

The average birth weight is found to be low in lower

The study shows that the mean birth weight is around 2300 gm for those babies whose mothers are either illiterate or has primary level education. Thereafter, percentage of LBW decreases remarkably with increase of educational level. A significant positive correlation is observed between birth weight and maternal education (Table-VII).

viii) Occupation of mother and birth weight:

The least mean birth weight (2432±499 gm) is observed among the babies of employed mothers. Proportion of LBW is less observed among the babies whose mothers are students. However,

Table V : Birth weight of newborn babies by residence

Mother's residence		Birth weight of newborn babies (gm)				Total n=560 (%)
		<1500 n=28 (%)	1500-1999 n=76 (%)	2000-2499 n=157 (%)	≥2500 n=299 (%)	
Urban	n=143	1.3	3.4	4.5	16.4	25.5
Periurban	n=128	0.7	1.8	7.0	13.4	22.9
Slum	n=33	0.9	1.6	2.9	0.5	5.9
Rural	n=256	2.1	6.8	13.8	23.0	45.7
Total	n=560	5.0	13.6	28.0	53.4	100.0

P>0.05

Table VI : Birth weight of newborns by mother's family income

Family income (in taka)		Birth weight of newborn babies (gm)				Total n=260 (%)
		<1500 n=28 (%)	1500-1999 n=76 (%)	2000-2499 n=157 (%)	≥2500 n=299 (%)	
Up to 2000	n=92	2.7	3.6	5.2	5.0	16.4
2001-4000	n=212	2.0	5.5	12.9	17.5	37.9
4001-6000	n=118	0.4	3.0	5.0	12.7	21.1
6001-8000	n=58	-	0.4	3.4	6.6	10.4
≥8001	n=63	-	1.1	1.6	11.6	14.3
Total	n=560	5.0	13.6	28.0	53.4	100.0

P<0.01

Table VII : Birth weight of newborn babies by maternal educational status

Maternal educational status		Birth weight of newborn babies (gm)				Total n=260 (%)
		<1500 n=28 (%)	1500-1999 n=76 (%)	2000-2499 n=157 (%)	≥2500 n=299 (%)	
Illiterate	n=91	0.9	3.4	6.3	5.7	16.3
Primary	n=132	2.0	4.5	7.3	9.8	23.6
Secondary	n=166	1.3	2.7	9.5	13.6	29.6
S.S.C-H.S.C.	n=108	0.9	1.6	3.9	12.9	19.3
Graduate-Master	n=63	-	1.4	1.1	8.8	11.3
Total	n=560	5.0	13.6	28.0	53.4	100.0

P<0.01

Table VIII : Distribution of baby's birth weight by maternal occupation

Maternal occupation		Birth weight of newborn babies (gm)				Total n=260 (%)
		<1500 n=28 (%)	1500-1999 n=76 (%)	2000-2499 n=157 (%)	≥2500 n=299 (%)	
House wife	n=501	5.0	11.1	25.4	48.0	89.5
Employed	n=47	-	2.3	2.3	3.8	8.4
Student	n=12	-	0.2	0.4	1.6	2.1
Total	n=560	5.0	13.6	28.0	53.4	100.0

P<0.01

percentage of LBW is higher in working mother than that of housewife. The difference is quite significant ($p < 0.05$) (Table-VIII).

Discussion

The present study shows association of some important socio-biological factors to birth weight of newborn baby. Parity of mother, birth spacing, duration of pregnancy, maternal residences, family income, educational status and occupation of mothers are significantly associated with birth weight. Association of maternal age with birth weight of baby is found to be statistically insignificant as a whole. However, marked lower average weighted babies are delivered by mothers of <20 years old. In this work, the teen-age mothers also deliver higher percentage of LBW babies. This finding is almost similar to the findings of other workers^{8,10}. Here, 55.8% teen age mothers give birth of LBW babies in contrast to 36% in study conducted by Ahmed FU et al¹⁰. This difference is may be due to the fact that the later work is conducted retrospectively or due to some other confounding factors.

Parity of mother is usually associated with birth weight. However, after attaining a maximum weight at fourth or fifth parity, a decrease in birth weight with subsequent parity has been seen^{11,12}. In this work, higher weighted babies are observed in third parity after which there is a tendency of declining of birth weight. Proportion of low birth weight babies is higher when birth spacing is 2 years or less. Birth weight increases when spacing is more than 2 years with increment of duration of pregnancy. This finding cross ponds to finding of Das JC and Khanam ST². These findings may remind necessity of proper spacing of at least 2 years along with limitation of number of pregnancy properly.

In this work, strong positive correlation of gestational age of baby to birth weight is observed. Prevalence of LBW baby is very high in preterm baby than its counter part. This finding also cross ponds to findings of other workers^{8,13}.

Mothers of slum areas deliver higher proportion (90.9%) of LBW babies in contrast to mothers of urban society who deliver only about 36% LBW babies. This difference is may be due to presence of more unprivileged malnourished mothers in slum in contrast to well nourished mothers in urban areas and or due to other confounding factors.

Like other study^{3,13}, this work shows increment of mean birth weight with rise of economical condition. Better nutritional supplementation and antenatal supervision in high economic group perhaps play a beneficial role in increasing birth weight in this group.

Mother's literacy of secondary school to onward has beneficial effect on birth weight probably due to their healthy life style in comparison to no illiteracy or literacy of primary level. Again, higher incidence of LBW in employed mother than house wife may be due to less facility of taking rest during pregnancy or other confounding factors.

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